WHAT IS CLAIMED IS:

1. A substrate polishing apparatus comprising:

a polishing table having a polishing surface; and

a top ring for holding a substrate;

wherein a semiconductor substrate held by said top ring is pressed against said polishing surface of said polishing table and a surface to be polished of the semiconductor substrate is polished by a relative movement between the semiconductor substrate and said polishing surface;

the apparatus further comprising:

pressing force changing mechanism for changing an pressing force for pressing the semiconductor substrate;

relative movement speed changing mechanism for changing the speed of relative movement between said top ring and said polishing table; and

control mechanism;

wherein said control mechanism performs plural polishing processes on the same polishing table while changing the pressing force and the relative movement through said pressing force changing mechanism and said relative movement speed mechanism.

2. A substrate polishing apparatus according to claim 1, further comprising film thickness detecting means for detecting a film thickness of the semiconductor substrate, and wherein said control mechanism performs transfer from the preceding polishing process to the next polishing process on the basis of a film thickness detection signal

detected by said film thickness detecting means.

3. A substrate polishing apparatus according to claim 1 or 2, further comprising dressing means for dressing said polishing surface of said polishing table or cleaning means for cleaning said polishing surface of said polishing table, and wherein said control mechanism controls said dressing means or said cleaning means between the polishing processes to effect the dressing or the cleaning of said polishing surface of said polishing table.

4. A substrate polishing method in which a semiconductor substrate held by a top ring is pressed against a polishing surface of a polishing table and a surface to be polished of the semiconductor substrate is polished by a relative movement between the semiconductor substrate and said polishing surface, wherein:

the semiconductor substrate is polished on the same polishing table through plural polishing processes while changing an pressing force for pressing the semiconductor substrate and the number of revolutions of said top ring and/or said polishing table.

5. A substrate polishing method according to claim 4, wherein, when said plural polishing processes are performed, the polishing is effected while adding polishing liquid and/or reagent liquid having having pH at the same side as pH 7.

6. A substrate polishing method according to claim 4, wherein, when said plural polishing processes are performed, the polishing is effected by using same abrasive

grain.

7. A substrate polishing method in which a semiconductor substrate held by a top ring is pressed against a polishing surface of a polishing table and a surface to be polished of the semiconductor substrate is polished by a relative movement between the semiconductor substrate and said polishing surface,

wherein the polishing is effected on a single polishing table through plural stage polishing processes, and, after one stage polishing process is finished, said polishing surface of said polishing table is cleaned, and then the next stage polishing process is performed.

8. A substrate polishing method in which a substrate held by a top ring is pressed against a polishing surface of a polishing table and a film formed on a surface of the semiconductor substrate is polished to achieve flatness by a relative movement between the semiconductor substrate and said polishing surface,

wherein the polishing is performed through three or more polishing processes in which at least one of a substrate pressing load for pressing the substrate against said polishing surface of said polishing table, a relative speed between said polishing table and the substrate and polishing liquid is changed.

9. A substrate polishing method according to claim 8, wherein completion of at least last polishing process among three or more polishing processes is determined by detection of a thickness of the film.

10. A substrate polishing method according to claim 8, wherein, after at least last polishing process among three or more polishing processes is finished, a water polishing process using water as the polishing liquid is performed.

11. A substrate polishing method according to claim 10, wherein an atomizer polishing process using mixture of water and inert gas as the polishing liquid is added to the water polishing process.

12. A substrate polishing method according to claim 8, wherein the film formed on the substrate surface a film comprised of an oxidation film, a Ti film, a TiN film and a W film successively laminated on the substrate surface.